

[A-83]

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**SARDAR PATEL UNIVERSITY**  
**T.Y.B.Sc. Examination, SIXTH Semester**  
**Friday, 1<sup>st</sup> April 2016**  
**Time : 02.30 pm To 05.30 pm**  
**Instrumentation Course Code : USO6CINS03**  
**Course Title : Advanced Control System**

**Total Marks : 70**

**Q-1 Write answers to the following multiple choice questions in your answer book by [10] selecting the proper option.**

- (1) The feedforward control offers large improvements over feedback control for processes that have \_\_\_\_\_ time constant.  
(a) large (b) small (c) zero (d) infinite
- (2) In predictive control the predicted process dynamic output is \_\_\_\_\_ the desired dynamic output.  
(a) greater than (b) less than (c) equal to (d) less or equal to
- (3) In cascade control, the outer loop is also called \_\_\_\_\_ loop.  
(a) secondary (b) primary (c) lower (d) higher
- (4) When the channels are polled in some particular order, a channel scan \_\_\_\_\_ is maintained in the memory  
(a) log (b) array (c) series (d) list
- (5) The SCADA systems directly connected to transducers are called \_\_\_\_\_.  
(a) nodes (b) points (c) junctions (d) terminals
- (6) In old days (1960s) people were using \_\_\_\_\_ control for the plant processes.  
(a) centralized (b) distributed (c) cascaded (d) optimized
- (7) Which one of the following is most suitable as the requirement for a maintenance engineer?  
(a) modular design (b) self-diagnostic facility  
(c) both (a)&(b) (d) none of these
- (8) The person who undertakes the maintenance of a large variety of instruments in a plant is generally called \_\_\_\_\_ engineer.  
(a) maintenance (b) plant (c) design (d) supervising
- (9) In mathematical modelling non-linear systems are described by \_\_\_\_\_ differential equations.  
(a) non-linear (b) linear (c) quadratic (d) partial
- (10) Which one of the following is not one of the control strategies used in mathematical modelling?  
(a) time optimal (b) human optimal (c) fuel optimal (d) energy optimal

**Q-2 Answer the following questions in brief. (Answer any Ten Questions)**

**[20]**

- (1) Enlist the different types of advanced control strategies.
- (2) Enlist any four advantages of advanced control.
- (3) What are the requirements of ideal control methodology?
- (4) Write a short note on Fibre-Optic communications
- (5) Enlist the types of communication module.
- (6) Enlist the basic functions of SCADA systems.
- (7) Enlist any four requirements of a plant operator.
- (8) Draw the block diagram showing decentralized computer control concept.

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- (9) Provide a list of any four requirements of maintenance engineer.
- (10) Enlist any four analytical methods of parameter estimation in a mathematical modelling.
- (11) Enlist any four application examples of system modelling and simulation.
- (12) Enlist the examples of modelling and simulation in bio-engineering units.

Q-3 What is cascade control? Discuss the method for water temperature control in a tank. [10]

OR

Q-3 Describe the different aspects of feed forward control in case of three tank composition control system. Also establish relationship between manipulated and disturbance variable. [10]

- Q-4 (a) Write a detailed note on channel polling. [6]
- (b) Write a note on data processing. [4]

OR

- Q-4 (a) Explain how the data read from the output of ADC is converted to equivalent engineering units? [6]
- (b) Give an introduction to SCADA. [4]

- Q-5 (a) Discuss the concept of distributed and centralized control in detail. [6]
- (b) Write a note on maintenance engineer's requirements. [4]

OR

- Q-5 (a) Write a detailed note on advantages of distributed control systems. [6]
- (b) Write a note on development engineer's requirements. [4]

- Q-6 (a) Define the terms modelling and simulations in detail with the help of necessary equations and diagrams. [6]
- (b) Explain how the mathematical model of a plant can be build. [4]

OR

- Q-6 (a) Discuss the uses of simulations with the help of an example. [6]
- (b) Write a note on system modelling. [4]

